

# MI956

Intel® Sandy Bridge / PCH  
Mini-ITX Motherboard

## USER'S MANUAL

Version 1.0

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## Introduction

### Product Description

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The MI956F Mini ITX motherboard is based on the latest Intel® QM67 chipset. The platform supports 2<sup>nd</sup> generation Intel® Core processor family with rPGA988B packing and features an integrated dual-channel DDR3 memory controller as well as a graphics core.

The latest Intel® processors provide advanced performance in both computing and graphics quality. This meets the requirement of customers in the gaming, POS, digital signage and server market segment.

The Intel® QM67 is made with 32 nanometer technology that supports Intel's first processor architecture to unite the CPU and the graphics core on the transistor level. The MI956F Mini ITX board utilizes the dramatic increase in performance provided by this Intel's latest cutting-edge technology. Measuring 170mm x 170mm, MI956F offers fast 6Gbps SATA support (2 ports), USB3.0 (2 ports) and interfaces for DVI-D, DVI-I, LVDS and HDMI displays. MI956AF features Intel Active Management Technology 7.0.

#### MI956F FEATURES:

- Supports Intel® 2nd Generation Core i7/i5/i3 QC/DC mobile processors
- Two DDR3 SoDIMM, 1066/1333MHz, Max. 16GB memory
- Dual Intel® PCI-Express Gigabit LAN
- Integrated Graphics for DVI-I, DVI-D/HDMI/LVDS displays
- 4x SATA 2.0, 2x SATA 3.0, 8x USB 2.0, USB 3.0 (2 ports), 4x COM, Watchdog timer
- 1x PCI-E (x16), 1x Mini PCI-E
- Optional AMT (MI956AF only)

## **Checklist**

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Your MI956 package should include the items listed below.

- The MI956 Mini-ITX motherboard
- This User's Manual
- 1 CD containing chipset drivers and flash memory utility
- Serial ATA cable

## MI956 Specifications

<b>Product Name</b>	<b>MI956AF/MI956F</b>
<b>Form Factor</b>	Mini-ITX
<b>CPU Type</b>	<ul style="list-style-type: none"> <li>- Intel® 2<sup>nd</sup> generation Core™ i7/i5/i3 QC/DC mobile processor</li> <li>- rPGA package, 37.5 x 37.5 mm</li> <li>- TDP: QC = 45W~ 55W/ DC = 35W</li> <li>**Sandy Bridge CPU is <u>NOT</u> socket compatible with Arrandale</li> </ul>
<b>CPU Speed</b>	Up to 2.7GHz
<b>Cache</b>	Up to 8MB
<b>CPU Socket</b>	rPGA 988B
<b>Chipset</b>	Intel® QM67 PCH; 25 x 27 mm package size
<b>BIOS</b>	AMI BIOS, support ACPI Function
<b>Memory</b>	<ul style="list-style-type: none"> <li>- Intel® 2<sup>nd</sup> generation Core™ i7/i5/i3 QC/DC mobile processor integrated memory controller</li> <li>- DDRIII 1067/1333 MHz</li> <li>- SO-DIMM x 2 (w/o ECC), Max. 16GB</li> </ul>
<b>VGA</b>	<ul style="list-style-type: none"> <li>- Intel® 2<sup>nd</sup> generation Core™ i7/i5/i3 mobile processor integrated Gfx</li> <li>• DVI-I X 1 (thru Level shifter ASM1442)</li> <li>• DVI-D X 1 (thru Level shifter ASM1442)</li> <li>• HDMI X 1 (thru Level shifter ASM1442)</li> <li>• LVDS : DF13 x 2 for supporting dual channel 24-bit</li> </ul>
<b>LAN</b>	<ol style="list-style-type: none"> <li>1. Intel® Lewisville 82579LM GbE PHY[MI956AF only] or 82579V GbE PHY [MI956F only]</li> <li>2. Intel® 82583V as 2<sup>nd</sup> GbE</li> </ol>
<b>USB</b>	<ul style="list-style-type: none"> <li>- USB 2.0 host controller, supports 8 ports w/ two EHCI, 7 UHCI controllers</li> <li>- Integrated USB 2.0 Rate Matching Hub.</li> <li>- 4 ports in the rear panel</li> <li>- Others reserved for onboard pin header ( 4 ports, 2.54mm pitch)</li> <li>- USB 3.0 host controller [ASMedia # ASM1042], support 2 ports</li> <li>- 2 ports in the rear panel</li> </ul>
<b>Serial ATA</b>	Intel® QM67 PCH built-in SATA controller, supports total 6 ports 2 x SATA (3.0) 6Gbps+ 4 x SATA (2.0) 3Gbps ports (2 FIS based Port Multiplier)
<b>Audio</b>	Intel® QM67 PCH built-in High Definition Audio controller+ ALC892 w/ 7.1 CH
<b>LPC I/O</b>	<ul style="list-style-type: none"> <li>- Fintek F81865-I (Ver. C)</li> <li>- COM1 (RS232/422/485), COM2/COM3/COM4 (RS232), Hardware Monitor (2 thermal inputs,4 voltage monitor inputs &amp; 2 fan headers) [CPU FAN controllabl, but not the system fan]</li> <li>- COM1/2 with pin-9 with power for 2 ports (500 mA for each port)</li> </ul>
<b>Digital IO</b>	4 in & 4 out
<b>IAMT(7.0)</b>	<ul style="list-style-type: none"> <li>- Intel® QM67 PCH built-in (MI956AF only)</li> <li>- Intel® Active Management Technology ver. 7.0</li> </ul>
<b>Expansion Slots</b>	<ul style="list-style-type: none"> <li>- PCI-Express (16x) *1 [PEG]</li> <li>- Mini PCI-Express (1x) *1 @ Solder side</li> <li>[Reserved mounting holes for Half-sized also]</li> </ul>
<b>Edge Connector:</b>	<ul style="list-style-type: none"> <li>- DVI-D + DVI-I stack connector; Dual DB9 stack connector for COM #1, #2</li> <li>- Dual USB(3.0) dual stack connector; HDMI stack connector</li> <li>- Gbit LAN RJ-45 + dual USB(2.0) stack connector x2</li> <li>- RCA Jack 3x1 for HD Audio</li> </ul>
<b>Onboard Header/ Connector</b>	<ul style="list-style-type: none"> <li>- 2 ports x SATA III [Blue color]; 4 ports x SATA II</li> <li>- 2x5 pin-header x2 for 4 ports USB; 2x5 pin-header for front panel audio</li> <li>- 2x10 pin-header for COM3 (RS232) &amp; COM4 (RS232)</li> <li>- 2x5 pin-header for Digital IO; 4-pin box header for LCD backlight control</li> </ul>
<b>Watchdog Timer</b>	Yes (256 segments, 0, 1, 2...255 sec/min)
<b>System Voltage</b>	ATX
<b>Others</b>	LAN Wakeup, EuP/ErP feature (Fintek F75160), UL 60950-1 2 <sup>nd</sup> Edition compatible

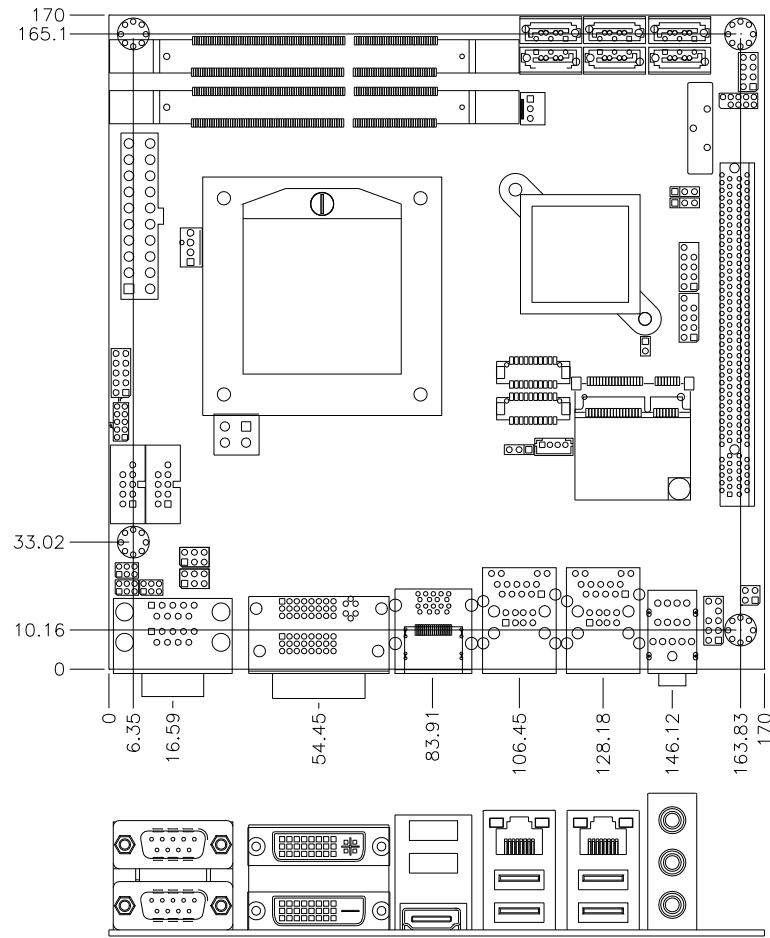
## INTRODUCTION

Board Size

170mm x 170mm

## Board Dimensions

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## Installations

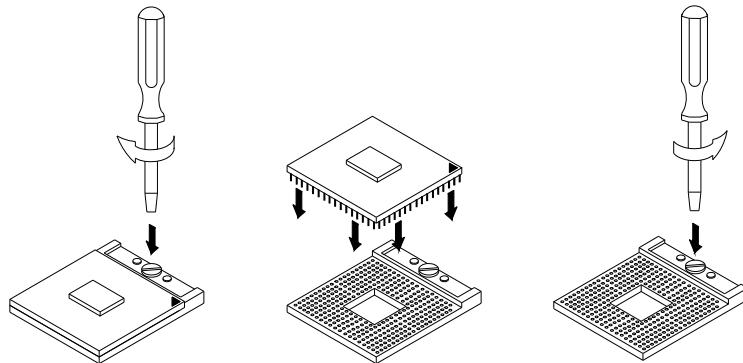
This section provides information on how to use the jumpers and connectors on the MI956 in order to set up a workable system. The topics covered are:

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## Installing the CPU

The MI956 board supports rPGA988B socket for Intel® Sandy Bridge Dual Core mobile processors.

The processor socket comes with a screw to secure the processor. As shown in the left picture below, loosen the screw first before inserting the processor. Place the processor into the socket by making sure the notch on the corner of the CPU corresponds with the notch on the inside of the socket. Once the processor has slide into the socket, fasten the screw. Refer to the figures below.



**NOTE:** Ensure that the CPU heat sink and the CPU top surface are in total contact to avoid CPU overheating problem that would cause your system to hang or be unstable.

## **Installing the Memory**

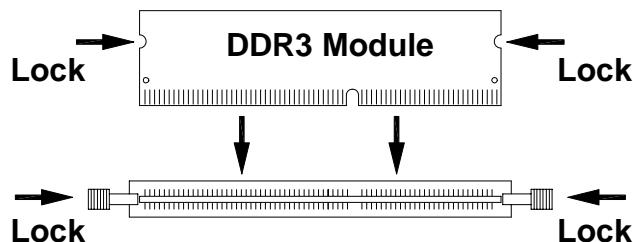
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The MI956 board supports two DDR3 memory socket for a maximum total memory of 16GB in DDR3 SO-DIMM memory type.

### **Installing and Removing Memory Modules**

To install the DDR3 modules, locate the memory slot on the board and perform the following steps:

1. Hold the DDR3 module so that the key of the DDR3 module aligned with that on the memory slot.
2. Gently push the DDR3 module in an upright position until the clips of the slot close to hold the DDR3 module in place when the DDR3 module touches the bottom of the slot.
3. To remove the DDR3 module, press the clips with both hands.



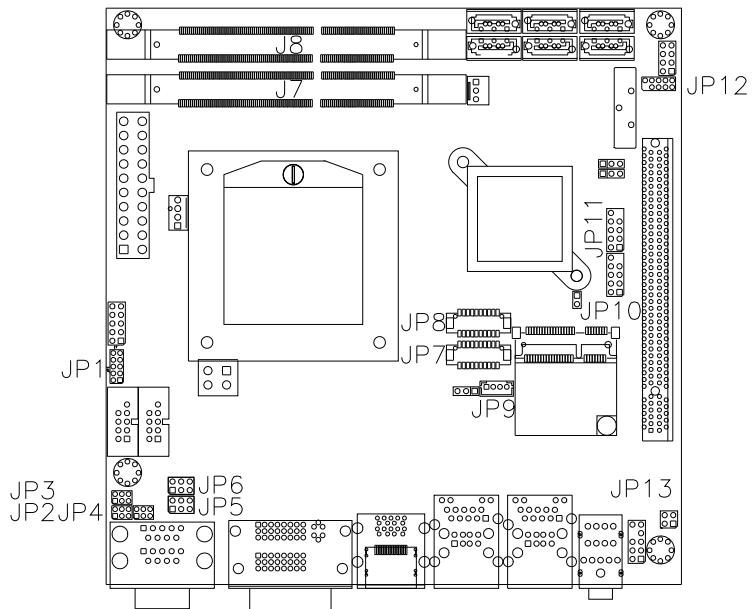
## **Setting the Jumpers**

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Jumpers are used on MI956 to select various settings and features according to your needs and applications. Contact your supplier if you have doubts about the best configuration for your needs. The following lists the connectors on MI956 and their respective functions.

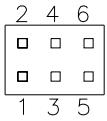
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**Jumper Locations on MI956**



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**JP2, JP3, JP4: RS232/RS422/RS485 (COM1) Selection**

COM1 Function	RS-232	RS-422	RS-485
 Jumper Setting (pin closed)	JP2: 3-5&4-6	JP2: 1-3&2-4	JP2: 1-3&2-4

**JP5: COM1 RS232 RI/+5V/+12V Power Setting**

JP5	Setting	Function
 Pin 1-2 Short/Closed		+12V
 Pin 3-4 Short/Closed		RI
 Pin 5-6 Short/Closed		+5V

**JP6: COM2 RS232 RI/+5V/+12V Power Setting**

JP6	Setting	Function
 Pin 1-2 Short/Closed		+12V
 Pin 3-4 Short/Closed		RI
 Pin 5-6 Short/Closed		+5V

**J10: LCD Panel Power Selection**

J10	LCD Panel Power
 1 2 3	3.3V
 1 2 3	5V

**J14: Flash Descriptor Security Overide (Factory use only)**

J14	Flash Descriptor Security Overide
Open	Disabled (Default)
Close	Enabled

**J22: Clear ME Contents**

J22	Setting	Function
 1 2 3	Pin 1-2 Short/Closed	Normal
 1 2 3	Pin 2-3 Short/Closed	Clear ME

**J23: Clear CMOS Contents**

J23	Setting	Function
 1 2 3	Pin 1-2 Short/Closed	Normal
 1 2 3	Pin 2-3 Short/Closed	Clear CMOS

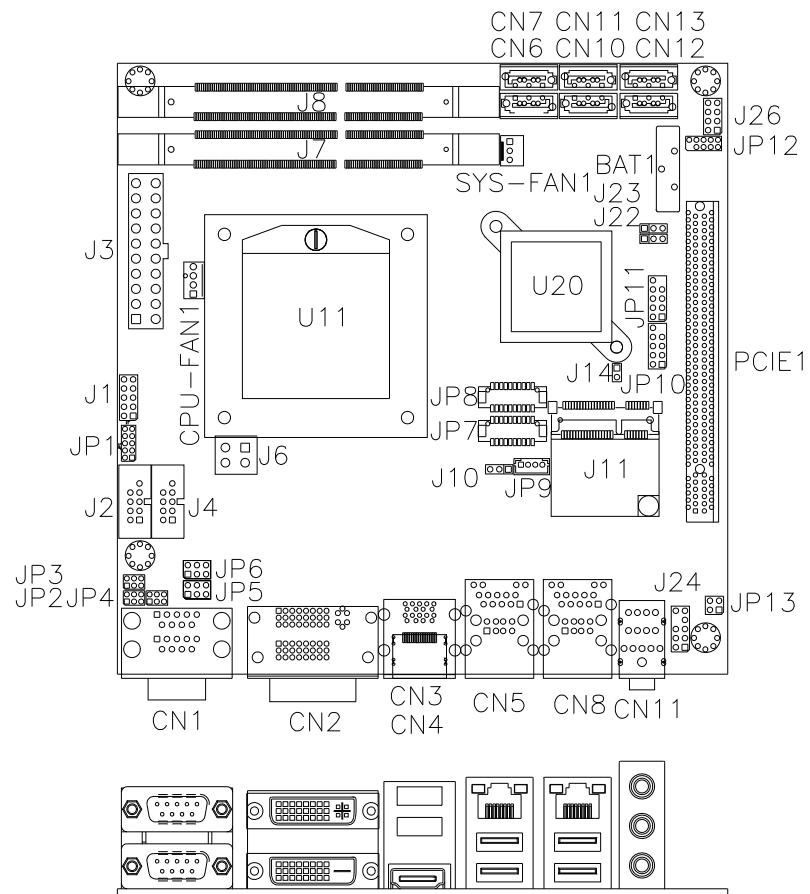
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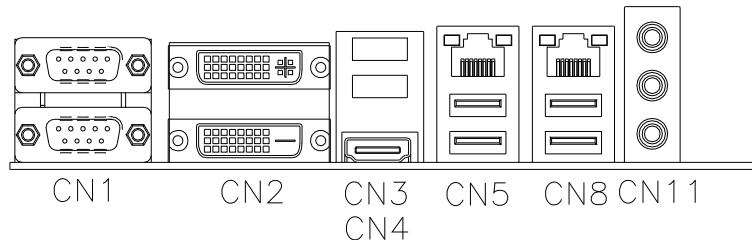
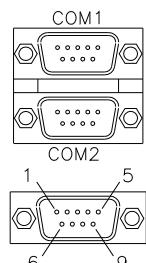
## Connectors on MI956

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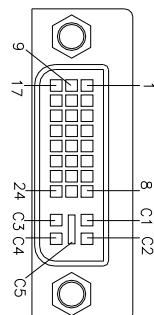
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**Connector Locations on MI956**

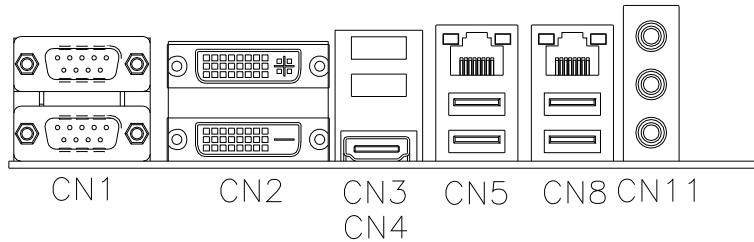


**CN1: COM1 and COM2 Serial Ports**

Pin #	Signal Name		
	RS-232	R2-422	RS-485
1	DCD	TX-	DATA-
2	RX	TX+	DATA+
3	TX	RX+	NC
4	DTR	RX-	NC
5	Ground	Ground	Ground
6	DSR	NC	NC
7	RTS	NC	NC
8	CTS	NC	NC
9	RI	NC	NC
10	NC	NC	NC

**CN2: DVI-D and DVI-I Connector**

Signal Name	Pin #	Pin #	Signal Name
DATA 2-	1	16	HOT POWER
DATA 2+	2	17	DATA 0-
Shield 2/4	3	18	DATA 0+
DATA 4-	4	19	SHIELD 0/5
DATA 4+	5	20	DATA 5-
DDC CLOCK	6	21	DATA 5+
DDC DATA	7	22	SHIELD CLK
N.C	8	23	CLOCK -
DATA 1-	9	24	CLOCK +
DATA 1+	10	C1	N.C
SHIELD 1/3	11	C2	N.C
DATA 3-	12	C3	N.C
DATA 3+	13	C4	N.C
DDC POWER	14	C5	A GROUND2
A GROUND 1	15	C6	A GROUND3



Signal Name	Pin #	Pin #	Signal Name
DATA 2-	1	16	HOT POWER
DATA 2+	2	17	DATA 0-
Shield 2/4	3	18	DATA 0+
DATA 4-	4	19	SHIELD 0/5
DATA 4+	5	20	DATA 5-
DDC CLOCK	6	21	DATA 5+
DDC DATA	7	22	SHIELD CLK
N.C.	8	23	CLOCK -
DATA 1-	9	24	CLOCK +
DATA 1+	10	C1	N.C.
SHIELD 1/3	11	C2	N.C.
DATA 3-	12	C3	N.C.
DATA 3+	13	C4	N.C.
DDC POWER	14	C5	N.C.
A GROUND 1	15	C6	N.C.

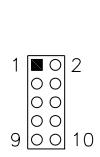
**CN3: USB3.0 Connector**

**CN4: HDMI Connector**

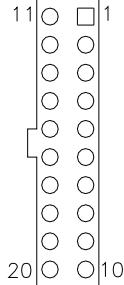
**CN5: Gigabit LAN (Intel 82579LM) + USB 2/3**

**CN8: Gigabit LAN (Intel 82583V) + USB 0/1**

**CN11: HD Audio Connector**

**J1: Digital I/O**

Signal Name	Pin	Pin	Signal Name
GND	1	2	VCC
OUT3	3	4	OUT1
OUT2	5	6	OUT0
IN3	7	8	IN1
IN2	9	10	IN0

**J3: ATX Power Supply Connector**

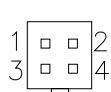
Signal Name	Pin #	Pin #	Signal Name
3.3V	11	1	3.3V
-12V	12	2	3.3V
Ground	13	3	Ground
PS-ON	14	4	+5V
Ground	15	5	Ground
Ground	16	6	+5V
Ground	17	7	Ground
-5V	18	8	Power good
+5V	19	9	5VSB
+5V	20	10	+12V

**J2, J4: COM3, COM4 RS232 Serial Ports**

Signal Name	Pin #	Pin #	Signal Name
DCD#	1	6	DSR#
SIN#	2	7	RTS#
SOUT	3	8	CTS#
DTR#	4	9	RI#
GND	5	X	KEY

**J6: ATX 12V Power Connector**

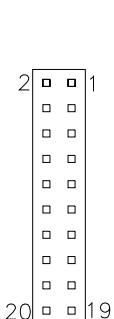
This connector supplies the CPU operating voltage.



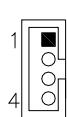
Pin #	Signal Name
1	Ground
2	Ground
3	+12V
4	+12V

**JP8, JP7: LVDS Connectors (1st channel, 2nd channel)**

The LVDS connectors on board consist of the first channel (LVDS1) and second channel (LVDS2).



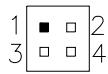
Signal Name	Pin #	Pin #	Signal Name
TX0-	2	1	TX0+
Ground	4	3	Ground
TX1-	6	5	TX1+
5V/3.3V	8	7	Ground
TX3-	10	9	TX3+
TX2-	12	11	TX2+
Ground	14	13	Ground
TXC-	16	15	TXC+
5V/3.3V	18	17	ENABKL
+12V	20	19	+12V

**JP9: LCD Backlight Connector**

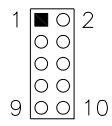
Pin #	Signal Name
1	+12V
2	Backlight Enable
3	Brightness Control
4	Ground

**JP10, JP11: USB Connectors**

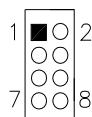
Signal Name	Pin	Pin	Signal Name
VCC	1	2	Vcc
D0-	3	4	D1-
D0+	5	6	D1+
GND	7	8	GND
KEY	9	10	NC

**JP13: SPDIF I/O**

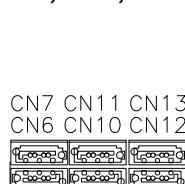
Pin #	Signal Name
1	SPDIF IN
2	Ground
3	SPDIF OUT
4	Ground

**J24: Audio Pin Header for Chassis Front Panel**

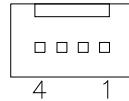
Signal Name	Pin	Pin	Signal Name
MIC IN_L	1	2	Ground
MIC IN_R	3	4	DET
LINE_R	5	6	Ground
Sense	7	8	KEY
LINE_L	9	10	Ground

**J26: Front Panel Connector**

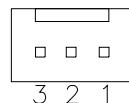
Signal Name	Pin #	Pin #	Signal Name
Power BTN	1	2	Power BTN
HDD LED+	3	4	HDD LED-
Reset BTN	5	6	Reset BTN
Power LED+	7	8	Power LED-

**CN6, CN7, CN9, CN10, CN12, CN13: SATA Connectors**

Pin #	Signal Name
1	Ground
2	TX+
3	TX-
4	Ground
5	RX-
6	RX+
7	Ground

**CPU\_FAN1: CPU Fan Power Connector**

Pin #	Signal Name
1	Ground
2	+12V
3	Rotation detection
4	Control

**SYS\_FAN1: System Fan1 Power Connector**

Pin #	Signal Name
1	Ground
2	+12V
3	NC

**JP1: LPC Debug Connector (Factory use only)**

**J11: Mini-PCIE Connector**

**JP12: SPI Flash Connector (Factory use only)**

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## **BIOS Setup**

This chapter describes the different settings available in the AMI BIOS that comes with the board. The topics covered in this chapter are as follows:

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## **BIOS Introduction**

The BIOS (Basic Input/Output System) installed in your computer system's ROM supports Intel processors. The BIOS provides critical low-level support for a standard device such as disk drives, serial ports and parallel ports. It also password protection as well as special support for detailed fine-tuning of the chipset controlling the entire system.

## **BIOS Setup**

The BIOS provides a Setup utility program for specifying the system configurations and settings. The BIOS ROM of the system stores the Setup utility. When you turn on the computer, the BIOS is immediately activated. Pressing the **<Del>** key immediately allows you to enter the Setup utility. If you are a little bit late pressing the **<Del>** key, POST (Power On Self Test) will continue with its test routines, thus preventing you from invoking the Setup. If you still wish to enter Setup, restart the system by pressing the "Reset" button or simultaneously pressing the **<Ctrl>**, **<Alt>** and **<Delete>** keys. You can also restart by turning the system Off and back On again. The following message will appear on the screen:

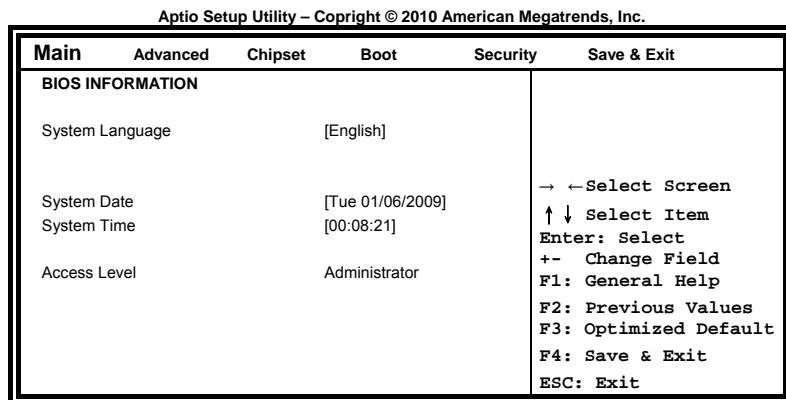
Press **<DEL>** or **<F2>** to Enter Setup

In general, you press the arrow keys to highlight items, **<Enter>** to select, the **<PgUp>** and **<PgDn>** keys to change entries, **<F1>** for help and **<Esc>** to quit.

When you enter the Setup utility, the Main Menu screen will appear on the screen. The Main Menu allows you to select from various setup functions and exit choices.

## Main BIOS Setup

This setup allows you to record some basic hardware configurations in your computer system and set the system clock.



**Note:** *If the system cannot boot after making and saving system changes with Setup, the AMI BIOS supports an override to the CMOS settings that resets your system to its default.*

**Warning:** *It is strongly recommended that you avoid making any changes to the chipset defaults. These defaults have been carefully chosen by both AMI and your system manufacturer to provide the absolute maximum performance and reliability. Changing the defaults could cause the system to become unstable and crash in some cases.*

### System Language

Choose the system default language.

### System Date

Set the Date. Use Tab to switch between Data elements.

### System Time

Set the Time. Use Tab to switch between Data elements.

## Advanced Settings

This section allows you to configure and improve your system and allows you to set up some system features according to your preference.

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
Legacy OpROM Support					
Launch PXE OpROM			[Disabled]		
Launch Storage OpROM			[Enabled]		
▶ PCI Subsystem Settings				→ ← Select Screen	
▶ ACPI Settings				↑ ↓ Select Item	
▶ Wake up event setting				Enter: Select	
▶ CPU Configuration				+- Change Field	
▶ EuP/ErP Power Saving Controller				F1: General Help	
▶ SATA Configuration				F2: Previous Values	
▶ Intel TXT(LT) Configuration				F3: Optimized Default	
▶ PCH-FW Configuration				F4: Save & EXIT	
▶ AMT Configuration				ESC: Exit	
▶ USB Configuration					
▶ Super IO Configuration					
▶ H/W Monitor					
▶ Serial Port Console Redirection					
▶ Sandybridge DTS Configuration					
▶ Sandybridge PPM Configuration					

**REMARKS: The Intel AMT Configuration is available only on MI956AF, not MI956F.**

### Launch PXE OpROM

Enable or Disable Boot Option for Legacy Network Devices.

### Launch Storage OpROM

Enable or Disable Boot Option for Legacy Mass Storage Devices with Option ROM.

**PCI Subsystem Settings**

This section allows you to configure the PCI, PCI-X and PCI Express settings.

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
PCI Bus Driver Version	V 2.03.00				
PCI ROM Priority	EFI Compatible ROM				
<b>PCI Common Settings</b>					
PCI Latency Timer	32 PCI Bus Clocks				
VGA Palette Snoop	Disabled				
PERR# Generation	Disabled				
SERR# Generation	Disabled				
<b>PCI Express Device Settings</b>					
Relaxed Ordering	Disabled			→ ← Select Screen	
Extended Tag	Disabled			↑ ↓ Select Item	
No Snoop	Enabled			Enter: Select	
Maximum Payload	Auto			++ Change Field	
Maximum Read Request	Auto			F1: General Help	
<b>PCI Express Link Settings</b>				F2: Previous Values	
ASPM Support	Disabled			F3: Optimized Default	
<b>WARNING: Enabling ASPM may cause some PCI-E devices to fail</b>					
Extended Sync	Disabled			F4: Save & Exit	
				ESC: Exit	

**PCI ROM Priority**

In case of multiple Option ROMs (Legacy and EFI Compatible), specifies what PCI Option ROM to launch.

**PCI Latency Timer**

Value to be programmed into PCI Latency Timer Register.

**VGA Palette Snoop**

Enables or Disables VGA Palette Registers Snooping.

**PERR# Generation**

Enables or Disables PCI Device to Generate PERR#.

**SERR# Generation**

Enables or Disables PCI Device to Generate SERR#.

**Relaxed Ordering**

Enables or Disables PCI Express Device Relaxed Ordering.

**Extended Tag**

If ENABLED allows Device to use 8-bit Tag field as a requester.

**No Snoop**

Enables or Disables PCI Express Device No Snoop option.

**Maximum Payload**

Set Maximum Payload of PCI Express Device or allow System BIOS to select the value.

**Maximum Read Request**

Set Maximum Read Request Size of PCI Express Device or allow System BIOS to select the value.

**ASPM Support**

Set the ASPM Level: Force L0- Force all links to L0 Stage:

AUTO – BIOS auto configure:

DISABLE- Disables ASPM.

**Extended Synch**

If ENABLED allows generation of Extended Synchronization patterns.

## ACPI Settings

System ACPI Parameters.

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
Enable ACPI Auto Configuration	Disabled			→ ← Select Screen	
Enable Hibernation	Enabled			↑ ↓ Select Item	
ACPI Sleep State	S3 (Suspend to R...)			Enter: Select	
Lock Legacy Resources	Disabled			+- Change Field	
				F1: General Help	
				F2: Previous Values	
				F3: Optimized Default	
				F4: Save & Exit	
				ESC: Exit	

### Enable ACPI Auto Configuration

Enables or Disables BIOS ACPI Auto Configuration.

### Enable Hibernation

Enables or Disables System ability to Hibernate (OS/S4 Sleep State).  
This option may be not effective with some OS.

### ACPI Sleep State

Select the highest ACPI sleep state the system will enter, when the SUSPEND button is pressed.

### Lock Legacy Resources

Enables or Disables System Lock of Legacy Resources.

**Wake up event settings**

Enable/Disable Wake up event.

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
Wake system with Fixed Time	Disabled				→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save & Exit ESC: Exit
Wake on Ring	Disabled				
Wake on PCIE Wake Event	Disabled				

**Wake system with Fixed Time**

Enables or Disables System wake on alarm event. When enabled, System will wake on the hr::min:: sec specified.

**Wake on Ring**

The options are Disabled and Enabled.

**Wake on PCIE Wake Event**

The options are Disabled and Enabled.

**CPU Configuration**

This section shows the CPU configuration parameters.

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
CPU Configuration					
Intel® Core™ i7-7210QE CPU @ 2.10GHz					
EMT64	Supported				
Max Processor Speed	2100 MHz				
Min Processor Speed	800 MHz				
Processor Speed	2100 MHz				
Processor Stepping	206a7				
Microcode Revision	D				
Processor Cores	4				
Intel HT Technology	Supported				
Hyper-threading	Enabled				→ ← Select Screen
Active Processor Cores	All				↑ ↓ Select Item
Limit CPUID Maximum	Disabled				Enter: Select
Execute Disable Bit	Enabled				++ Change Field
Hardware Prefetcher	Enabled				F1: General Help
Adjacent Cache Line Prefetch	Enabled				F2: Previous Values
Intel Virtualization Technology	Disabled				F3: Optimized Default
Local x2APIC	Disabled				F4: Save & Exit
					ESC: Exit

**Hyper-threading**

Enabled for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and Disabled for other OS (OS not optimized for Hyper-Threading Technology). When Disabled, only one thread per enabled core is enabled.

**Active Processor Cores**

Number of cores to enable in each processor package.

**Limit CPUID Maximum**

Disabled for Windows XP.

**Execute Disable Bit**

XD can prevent certain classes of malicious buffer overflow attacks when combined with a supporting OS (Windows Server 2003 SP1, Windows XP SP2, SuSE Linux 9.2, RedHat Enterprise 3 Update 3.)

**Hardware Prefetcher**

To turn on/off the MLC streamer prefetcher.

**Adjacent Cache Line Prefetch**

To turn on/off prefetching of adjacent cache lines.

**Intel Virtualization Technology**

When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology

**Local x2APIC**

Enable Local x2APIC. Some OSes do not support this.

**EuP/ErP Power Saving Controller**

Saving the power consumption on power off.

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
Standby Power on S5	All Enable			[Enable] Provide the Standby Power for devices. [Disable] Shutdown the standby power.	

**SATA Configuration**

SATA Device Options Settings

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
<b>SATA Controllers(s)</b>	Enabled			Enable or disable SATA Device.	
SATA Mode Selection	IDE				
Serial ATA Port 0	Empty			→ ← Select Screen	
Software Preserve	Unknown			↑ ↓ Select Item	
Serial ATA Port 1	Empty			Enter: Select	
Software Preserve	Unknown			+- Change Field	
Serial ATA Port 2	Empty			F1: General Help	
Software Preserve	Unknown			F2: Previous Values	
Serial ATA Port 3	Empty			F3: Optimized Default	
Software Preserve	Unknown			F4: Save & Exit	
Serial ATA Port 4	Empty			ESC: Exit	
Software Preserve	Unknown				
Serial ATA Port 5	Empty				
Software Preserve	Unknown				

**SATA Mode**

Determines how SATA controllers(s) operate. The options are IDE, AHCI and RAID.

**PCH-FW Configuration**

Configure Management Engine Technology Parameters.

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
ME FW Version	0.0.0.0				Configure Management Engine Technology Parameters.
ME Firmware Mode					
ME Firmware Type	Full Sku Firmware				
ME Firmware SKU	Unidentified				
<b>Firmware Update Configuration</b>					
					→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save & Exit ESC: Exit

**AMT Configuration**

Configure Active Management Technology Parameters.

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
Intel AMT	Enabled				
Intel AMT Setup Prompt	Enabled				
BIOS Hotkey Pressed	Disabled				
MEBx Selection Screen	Disabled				
Verbose Mebx Output	Enabled				
Hide Un-Configure ME Confirmation	Disabled				
MeBx Debug Message Output	Disabled				
Un-Configure ME	Disabled				
Intel AMT Password Write Enabled	Enabled				
Amt Wait Timer	0				
ASF	Enabled				
Activate Remote Assistance Process	Disabled				
USB Configure	Enabled				
PET Progress	Enabled				
Intel AMT SPI Protected	Disabled				
AMT CIRA Timeout	0				
Watchdog	Disabled				
OS Timer	0				
BIOS Timer	0				

**Intel AMT**

Enable/Disable Intel® Active Management Technology BIOS Extension. Note: iAMT H/W is always enabled. This option just controls the BIOS extension execution. If enabled, this requires additional firmware in the SPI device.

**Intel AMT Setup Prompt**

OEMFLag Bit 0:

Enable/Disable Intel AMT Setup Prompt to wait for hot-key to enter setup.

**BIOS Hotkey Pressed**

OEMFLag Bit 1:

Enable/Disable BIOS hotkey press.

**MeBx Selection Screen**

OEMFLag Bit 2:

Enable/Disable MEBx selection screen.

**Verbose Mebx Output**

OEMFLag Bit 3:

Enable/Disable Verbose Mebx Output.

**Hide Un-Configure ME Confirmation**

OEMFLag Bit 6:

Hide Un-Configure ME without password Confirmation Prompt.

**MeBx Debug Message Output**

OEMFLag Bit 14:

Enable MEBx debug message output.

**Un-Configure ME**

OEMFLag Bit 15:

Un-Configure ME without password.

**Intel AMT Password Write Enabled**

Enable/Disable Intel AMT Password Write. Password is writeable when set Enable.

**Amt Wait Timer**

Set timer to wait before sending ASF\_GET\_BOOT\_OPTIONS.

**ASF**

Enable/Disable Alert Specification Format.

**Activate Remote Assistance Process**

Trigger CIRA boot.

**USB Configure**

Enable/Disable USB Configure function.

**PET Progress**

User can Enable/Disable PET Events progress to received PETevents or not.

**Intel Amt SPI Protected**

Enable/Disable Intel AMT SPI write protect.

**WatchDorg**

Enable/Disable Intel AMT SPI write protect.

**ASF**

Enable/Disable WatchDorg Timer.

**USB Configuration**

USB Configuration Parameters.

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
USB Configuration					
USB Devices:					
1 Keyboard, 2 Hubs					
Legacy USB Support	Enabled			→ ←Select Screen	
USB3.0 Support	Enabled			↑ ↓ Select Item	
XHCI Hand-off	Enabled			Enter: Select	
EHCI Hand-off	Enabled			++ Change Field	
USB hardware delays and time-outs:				F1: General Help	
USB transfer time-out	20 sec			F2: Previous Values	
Device reset time-out	20 sec			F3: Optimized Default	
Device power-up delay	Auto			F4: Save ESC: Exit	

**Legacy USB Support**

Enables Legacy USB support.

AUTO option disables legacy support if no USB devices are connected.  
DISABLE option will keep USB devices available only for EFI applications.

**USB3.0 Support**

Enable/Disale USB3.0 (XHCI) Controller support.

**XHCI Hand-off**

This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.

**EHCI Hand-off**

This is a workaround for OSes without EHCI hand-off support. The EHCI ownership change should be claimed by EHCI driver.

**USB transfer time-out**

The time-out value for Control, Bulk, and Interrupt transfers.

**Device reset time-out**

USB mass storage device Start Unit command time-out.

**Device power-up delay**

Maximum time the device will take before it properly reports itself to the Host Controller. ‘Auto’ uses default value: for a Root port it is 100 ms, for aHub port the delay is taken from Hub Descriptor.

## Super IO Configuration

System Super IO Chip Parameters.

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
Super IO Configuration					
Super IO Chip			Fintek F81865		→ ←Select Screen ↑ ↓ Select Item Enter: Select ++ Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save & Exit ESC: Exit
-> Serial Port 0 Configuration					
-> Serial Port 1 Configuration					
-> Serial Port 2 Configuration					
-> Serial Port 3 Configuration					
Power Failure			Always off		
ACPI Shutdown Temperature			Disabled		

### Serial Port Configuration

Set Parameters of Serial Ports. User can Enable/Disable the serial port and Select an optimal settings for the Super IO Device.

#### Power Failure

Options are:

Keep last state

Always on

Always off (default)

#### ACPI Shutdown Temperature

The default setting is Disabled.

**H/W Monitor**

Monitor hardware status.

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
PC Health Status					
CPU			+45 C		
System Temperature			+47 C		
CPU FAN Speed			5976 RPM		
VCC3V			+3.408 V		
Vcore			+1.104 V		
+5V			+5.087 V		
+12V			+12.232 V		
+1.5V			+1.600 V		
VSB3V			+3.384 V		
VBAT			+3.296 V		
Fan1 Smart Fan Control			Disabled		
→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save & Exit ESC: Exit					

**Temperatures/Voltages**

These fields are the parameters of the hardware monitoring function feature of the motherboard. The values are read-only values as monitored by the system and show the PC health status.

**Fan1 Smart Fan Control**

This field enables (50C/60C/70C) or disables the smart fan feature. At a certain temperature, the fan starts turning. Once the temperature drops to a certain level, it stops turning again.

**Serial Port Console Redirection**

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
COM0 (Disabled)					
Console Redirection			Port is Disabled		
COM4(PCI Dev0, Func0) (Disabled)					
Console Redirection			Port is Disabled		
Serial Port for Out-of-Band Management/				→ ← Select Screen	
Windows Emergency Management Services (EMS)				↑ ↓ Select Item	
Console Redirection		Enabled		Enter: Select	
Out-of-Band Mgmt Port		COM0 (Disabled)		+- Change Field	
Data Bits		8		F1: General Help	
Parity		None		F2: Previous Values	
Stop Bits		1		F3: Optimized Default	
Terminal Type		VT-UTF8		F4: Save & Exit	
				ESC: Exit	

**Console Redirection**

Console Redirection Enable/Disable.

**Out-of-Band Mgmt Port**

Microsoft Windows Emergency Management Services (EMS) allows for remote management of a Windows Server OS through a serial port.

**Terminal Type**

VT-UTF8 is the preferred terminal type for out-of-band management. The next best choice is VT100+ and then VT100.

**Sandybridge DTS Configuration**

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
Sandybridge DTS Configuration				→ ← Select Screen	
CPU DTS			Enabled	↑ ↓ Select Item	
				Enter: Select	
				+- Change Field	
				F1: General Help	
				F2: Previous Values	
				F3: Optimized Default	
				F4: Save & Exit	
				ESC: Exit	

**CPU DTS**

Disabled: ACPI thermal management uses EC reported temperature values.

Enabled: ACPI thermal management uses DTS SMM mechanism to obtain CPU temperature values.

Out of Spec: ACPI Thermal Management uses EC reported temperature values and TS SMM is used to handle Out of Spec.

**Sandybridge PPM Configuration**

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
Sandybridge PPM Configuration					
EIST	Enabled				→ ← Select Screen
Turbo Mode	Enabled				↑ ↓ Select Item
CPU C3 Report	Enabled				Enter: Select
CPU C6 Report	Enabled				+- Change Field
CPU C7 Report	Enabled				F1: General Help
					F2: Previous Values
					F3: Optimized Default
					F4: Save & Exit
					ESC: Exit

**EIST**

Enable/Disable Intel SpeedStep.

**Turbo Mode**

Turbo Mode.

**CPU C3 Report**

Enable/Disable CPU C3(ACPI C2) report to OS.

**CPU C6 Report**

Enable/Disable CPU C6(ACPI C3) report to OS.

**CPU C7 Report**

Enable/Disable CPU C7(ACPI C3) report to OS.

## Chipset Settings

This section allows you to configure and improve your system and allows you to set up some system features according to your preference.

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
▶ System Agent (SA) Configuration ▶ PCH-IO Configuration					

### System Agent (SA) Configuration

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
System Agent RC Version	1.1.0.0				
VT-d Capability	Supported				
VT-d	Enabled			→ ← Select Screen	
CHAP Device (B0:D7:F0)	Disabled			↑ ↓ Select Item	
Thermal Device (B0:D4:F0)	Disabled			Enter: Select	
Enable NB CRID	Disabled			+- Change Field	
▶ Intel IGFX Configuration				F1: General Help	
▶ DMI Configuration				F2: Previous Values	
▶ NB PCIe Configuration				F3: Optimized Default	
▶ Memory Configuration				F4: Save & Exit	
▶ GT – Power Management Control				ESC: Exit	

#### VT-d

Check to enable VT-d function on MCH.

#### Enable NB CRID

Enable or disable NB CRID WorkAround.

**Intel IGFX Configuration**

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
Intel IGFX Configuration					
IGFX VBIOS Version		2102			
IGFX Frequency		650 MHz			
Primary Display		Auto			→ ← Select Screen
Internal Graphics		Auto			↑ ↓ Select Item
GTT Size		2MB			Enter: Select
Aperture Size		256MB			+- Change Field
DVMT Pre-Allocated		64M			F1: General Help
DVMT Total Gfx Mem		256M			F2: Previous Values
Gfx Low Power Mode		Disabled			F3: Optimized Default
► LCD Control					F4: Save & Exit
					ESC: Exit

**Primary Display**

Select which of IGFX/PEG/PCI Graphics device should be Primary Display Or select SG for Switchable Gfx.

**Internal Graphics**

Keep IGD enabled based on the setup options.

**GTT Size**

Select the GTT Size: 1MB, 2MB.

**Aperture Size**

Select the Aperture Size: 128MB, 256MB, 512MB.

**DVMT Pre-Allocated**

Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device: 0M~512M.

**DVMT Total Gfx Mem**

Select DVMT5.0 Total Graphic Memory size used by the Internal Graphics Device: 128M, 256M, MAX.

**Gfx Low Power Mode**

This option is applicable for SFF only.

**LCD Control**

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
LCD Control					
Primary IGFX Boot Display			VBIOS Default		
Active LFP			No LVDS		
Panel Color Depth			18 Bit		→ ← Select Screen
LCD Panel Type			1024x768 LVDS		↑ ↓ Select Item
SDVO-LFP Panel Type			VBIOS Default		Enter: Select
Panel Scaling			Auto		++ Change Field
Spread Spectrum clock Chip			Off		F1: General Help
TV1 Standard			VBIOS Default		F2: Previous Values
TV2 Standard			VBIOS Default		F3: Optimized Default
ALS Support			Enabled		F4: Save & Exit
					ESC: Exit

**Primary IGFX Boot Display**

Select the Video Device which will be activated during PoST. This has no effect if external graphics present.

Secondary boot display selection will appear based on your selection. VGA modes will be supported only on primary display.

**Active LFP**

Select the Active LFP Configuration.

No LVDS: VBIOS does not enable LVDS.

Int-LVDS: VBIOS enables LVDS driver by Integrated encoder.

SDVO LVDS: VBIOS enables LVDS driver by SDVO encoder.

eDP Port-A: LFP Driven by Int-DisplayPort encoder from Port-A.

**Panel Color Depth**

Select the LFP Panel Color Depth: 18 Bit, 24 Bit.

**LCD Panel Type**

Select LCD panel used by Internal Graphics Device by selecting the appropriate setup item: 640x480 LVDS ~ 2048x1536 LVDS.

**SDVO-LFP Panel Type**

Select SDVO panel used by Internal Graphics Device by selecting the appropriate setup item: VBIOS Default, 1024x768 ~ 1600x1200.

**Panel Scaling**

Select the LCD panel scaling option used by the Internal Graphics Device: Auto, Off, Force Scaling.

**Spread Spectrum clock Chip**

Hardware: Spread is controlled by chip;  
 Software: Spread is controlled by BIOS.

**TV1 Standard**

Select the ability to configure a TV Format.

**TV2 Standard**

Select the ability to configure a TV Minor Format.

**ALS Support**

Valid only for ACPI.

Legacy = ALS Support though the IGD INT 10 function.

ACI = ALS support through an ACPI ALS driver.

**DMI Configuration**

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
DMI Configuration					
DMI		X4 Gen2			→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save & Exit ESC: Exit
DMI Vc1 Control	Enabled				
DMI Vcp Control	Enabled				
DMI Vcm Control	Enabled				
DMI Link ASPM Control	LoSL1				
DMI Extended Synch Control	Disabled				
DMI Gen 2	Enabled				

**NB PCIe Configuration**

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
NB PCIe Configuration					
PEG0		Not Present			→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save & Exit ESC: Exit
PEG0 – Gen X		Auto			
PEG0		Not Present			
PEG1 – Gen X		Auto			
PEG0		Not Present			
PEG2 – Gen X		Auto			
PEG0		Not Present			
PEG3 – Gen X		Auto			
Always Enable PEG		Disabled			

**Memory Configuration**

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
Memory Information					
Memory RC Version	1.1.0.0				
Memory Frequency	1333 Mhz				
Total Memory	4096 MB (DDR3)				
DIMM#0	4096 MB (DDR3)				
DIMM#1	Not Present				
DIMM#2	Not Present				
DIMM#3	Not Present				
CAS Latency (tCL)	9				
Minimum delay time					
CAS to RAS (tRCDmin)	9				
Row Precharge (tRPmin)	9				
Active to Precharge (tRASmin)	24				
DIMM profile	Default DIMM profile				→ ← Select Screen
Memory Frequency	Auto				↑ ↓ Select Item
Max TOLUD	Dynamic				Enter: Select
Nmode Support	Auto				+- Change Field
Memory Scrambler	Disabled				F1: General Help
RMT Crosser Support	Disabled				F2: Previous Values
MRC Fast Boot	Disabled				F3: Optimized Default
DIMM Exit Mode	Auto				F4: Save & Exit
					ESC: Exit

**GT – Power Management Control**

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
GT – Power Management Control					
GT Info		GT2 (0x116)			→ ← Select Screen
RC6 (Render Standby)		Enabled			↑ ↓ Select Item
GT OverClocking Support		Disabled			Enter: Select
					+- Change Field
					F1: General Help
					F2: Previous Values
					F3: Optimized Default
					F4: Save & Exit
					ESC: Exit

## PCI-IO Configuration

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
Intel PCH RC Version		1.1.0.0			
PCH LAN Controller		Enabled			
Wake on Lan Enabled		Disabled			
Azalia		Auto			
Azalia Docking Support Enable		Disabled			
Azalia PME Enable		Disabled			
Azalia Internal HDMI Codec		Enabled			
Display logic		Enabled			
CLKRUN# logic		Enabled			
Enable SB CRID		Disabled			
High Precision Event Timer Configuration				→ ← Select Screen	
High Precision Timer		Enabled		↑ ↓ Select Item	
SLP_S4 Assertion Width		4-5 Seconds		Enter: Select	
Set NAND Management Override		Enabled		+- Change Field	
► USB Configuration				F1: General Help	
► PCI Express Configuration				F2: Previous Values	
				F3: Optimized Default	
				F4: Save & Exit	
				ESC: Exit	

**Azalia**

Control Detectin of the Azalia device.

Disabled = Azalia will be unconditionally disabled.

Enabled = Azalia will be unconditionally enabled. Auto = Azalia will be enabled if present, disabled otherwise.

**Set NAND Management Override**Option to Override NAND Management to allow driver or 3<sup>rd</sup> parties software to configure the NAND module after POST.

## USB Configuration

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
EHCI1		Enabled			
EHCI2		Enabled			
USB Ports Per-Port Disable Control		Disabled			

**EHCI1**

Control the USB EHCI (USB2.0) functions.

One EHCI controller must always be enabled.

## PCI Express Configuration

Aptio Setup Utility

Main	Advanced	Chipset	Boot	Security	Save & Exit
PCI Express Clock Gating	Enabled				
DMI Link ASPM Control	LoSL1				
DMI Link Extended Synch Control	Disabled				
Subtractive Decode	Disabled				
▶ PCI Express Root Port1					
▶ PCI Express Root Port2					
▶ PCI Express Root Port3					
▶ PCI Express Root Port4					
▶ PCI Express Root Port5					
PCI Port 6 is assigned to LAN					
▶ PCI Express Root Port7					
▶ PCI Express Root Port8					
Low MMIO Align	64M				→ ← Select Screen
Initiate Graphic Adapter	PEG/IGD				↑ ↓ Select Item
Graphics Turbo IMON Current	31				Enter: Select
VT-d	Disabled				+- Change Field
PCI Express Port	Auto				F1: General Help
IGD Memory	32M				F2: Previous Values
PAVP Mode	Disabled				F3: Optimized Default
PEG Force Gen1	Disabled				F4: Save & Exit
					ESC: Exit

**DMI Clink ASPM Control**

The control of Active State Power Management on both NB side and SB side of the DMI Link.

**DMI Link Extended Synch Control**

The control of Extended Synch on SB side of the DMI Link.

## Boot Settings

This section allows you to configure the boot settings according to your preference.

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
Boot Configuration					
Setup Prompt Timeout			1		
Bootup NumLock State			On		
Quite Boot			Disabled		→ ← Select Screen
CM16 Module Version			07.63		↑ ↓ Select Item
GateA20			Upon Request		Enter: Select
Option ROM Messages			Force BIOS		+- Change Field
Interrupt 19 Capture			Disabled		F1: General Help
Boot Option Priorities					F2: Previous Values
					F3: Optimized Default
					F4: Save & Exit
					ESC: Exit

### Setup Prompt Timeout

Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.

### GateA20 Active

UPON REQUEST – GA20 can be disabled using BIOS services.  
ALWAYS – do not allow disabling GA20; this option is useful when any RT code is executed above 1MB.

### Option ROM Messages

Set display mode for Option ROM. Options are Force BIOS and Keep Current.

### Interrupt 19 Capture

Enable: Allows Option ROMs to trap Int 19.

### Boot Option Priorities

Sets the system boot order.

**Security Settings**

This section allows you to configure and improve your system and allows you to set up some system features according to your preference.

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
Password Description					→ ← Select Screen ↑ ↓ Select Item Enter: Select +- Change Field F1: General Help F2: Previous Values F3: Optimized Default F4: Save & Exit ESC: Exit
If ONLY the Administrator's password is set, then this only limits accesss to Setup and is only asked for when entering Setup. If ONLY the User's password is set, then this is a power on password and must be entered to boot or enter Setup. In Setup the User will have Administrator rights					
Administrator Password User Password Set User Password Set Master Password					

**Administrator Password**

Set Setup Administrator Password.

**User Password**

Set User Password.

## Save & Exit Settings

Aptio Setup Utility					
Main	Advanced	Chipset	Boot	Security	Save & Exit
Save Changes and Exit					
Discard Changes and Exit					
Save Changes and Reset					
Discard Changes and Reset					
Save Options					→ ← Select Screen
Save Changes					↑ ↓ Select Item
Discard Changes					Enter: Select
Restore Defaults					+- Change Field
Save as User Defaults					F1: General Help
Restore User Defaults					F2: Previous Values
Boot Override					F3: Optimized Default
Launch EFI Shell from filesystem device					F4: Save & Exit
					ESC: Exit

### Save Changes and Exit

Exit system setup after saving the changes.

### Discard Changes and Exit

Exit system setup without saving any changes.

### Save Changes and Reset

Reset the system after saving the changes.

### Discard Changes and Reset

Reset system setup without saving any changes.

### Save Changes

Save Changes done so far to any of the setup options.

### Discard Changes

Discard Changes done so far to any of the setup options.

### Restore Defaults

Restore/Load Defaults values for all the setup options.

**Save as User Defaults**

Save the changes done so far as User Defaults.

**Restore User Defaults**

Restore the User Defaults to all the setup options.

**Boot Override**

Pressing ENTER causes the system to enter the OS.

**Launch EFI Shell from filesystem device**

Attempts to Launch EFI Shell application (Shellx64.efi) from one of the available filesystem devices.

## Drivers Installation

This section describes the installation procedures for software and drivers. The software and drivers are included with the motherboard. If you find the items missing, please contact the vendor where you made the purchase. The contents of this section include the following:

Intel Chipset Software Installation Utility .....	52
VGA Drivers Installation .....	53
Realtek HD Audio Driver Installation.....	54
LAN Drivers Installation.....	55
Intel® Management Engine Interface .....	57
ASMedia USB 3.0 Drivers .....	59

### **IMPORTANT NOTE:**

After installing your Windows operating system, you must install first the Intel Chipset Software Installation Utility before proceeding with the drivers installation.

## Intel Chipset Software Installation Utility

---

The Intel Chipset Drivers should be installed first before the software drivers to enable Plug & Play INF support for Intel chipset components. Follow the instructions below to complete the installation.

1. Insert the CD that comes with the board. Click *Intel* and then *Intel(R) QM67/Q67 Chipset Drivers*.



2. Click *Intel(R) Chipset Software Installation Utility*.



3. When the Welcome screen to the Intel® Chipset Device Software appears, click *Next* to continue.

4. Click *Yes* to accept the software license agreement and proceed with the installation process.

5. On the Readme File Information screen, click *Next* to continue the installation.

6. The Setup process is now complete. Click *Finish* to restart the computer and for changes to take effect.

## VGA Drivers Installation

**NOTE:** Before installing the *Intel(R) QM67 Chipset Family Graphics Driver*, the Microsoft .NET Framework 3.5 SPI should be first installed.

To install the VGA drivers, follow the steps below.

1. Insert the CD that comes with the board. Click **Intel** and then **Intel(R) QM67/Q67 Chipset Drivers**.

2. Click **Intel(R) QM67 Chipset Family Graphics Driver**.



3. When the Welcome screen appears, click **Next** to continue.



4. Click **Yes** to agree with the license agreement and continue the installation.

5. On the Readme File Information screen, click **Next** to continue the installation of the Intel® Graphics Media Accelerator Driver.

6. On Setup Progress screen, click **Next** to continue.

7. Setup complete. Click **Finish** to restart the computer and for changes to take effect.

## Realtek HD Audio Driver Installation

---

Follow the steps below to install the Realtek HD Audio Drivers.

1. Insert the CD that comes with the board. Click **Intel** and then **Intel(R) QM67/Q67 Chipset Drivers**.

2. Click **Realtek High Definition Audio Driver**.



3. On the Welcome to the InstallShield Wizard screen, click **Yes** to proceed with and complete the installation process.



## LAN Drivers Installation

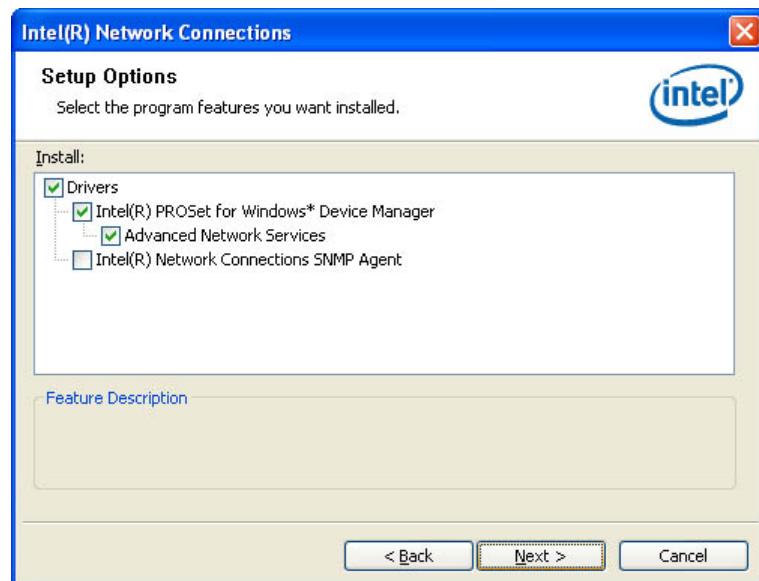
1. Insert the CD that comes with the board. Click **Intel** and then **Intel(R) QM67/Q67 Chipset Drivers**.

2. Click **Intel(R) PRO LAN Network Driver**.

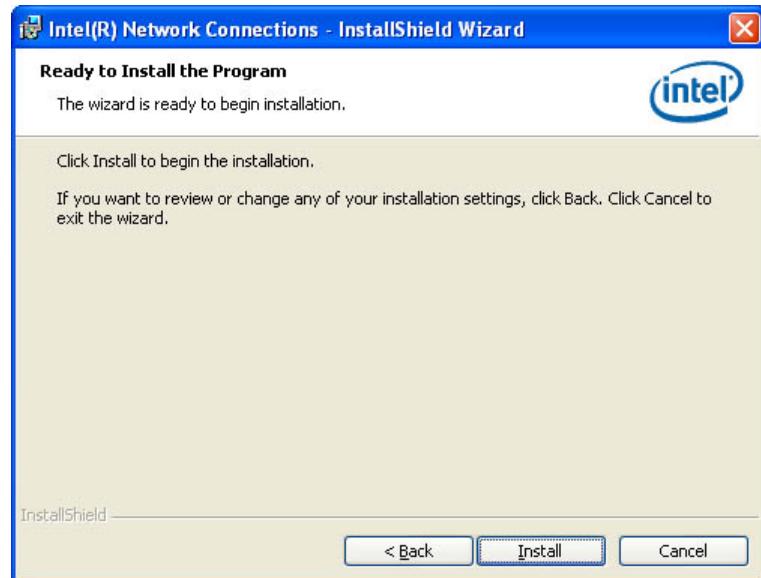


3. When the Welcome screen appears, click **Next**. On the next screen, click **Yes** to agree with the license agreement.

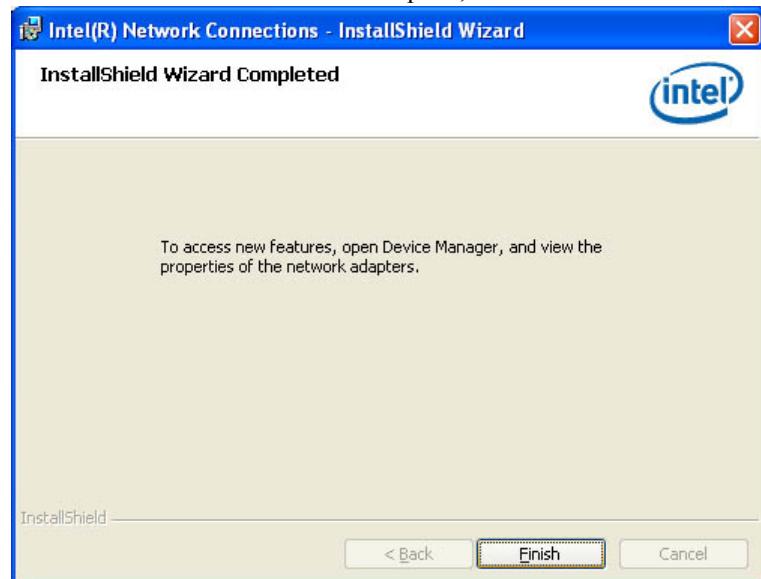
4. Click the checkbox for **Drivers** in the Setup Options screen to select it and click **Next** to continue.



5. The wizard is ready to begin installation. Click **Install** to begin the installation.

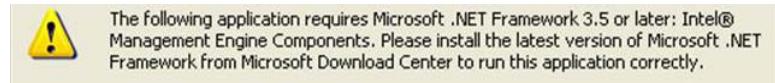


6. When InstallShield Wizard is complete, click **Finish**.



## Intel® Management Engine Interface

**REMARKS: The Intel iAMT 7.0 Drivers can be installed on MI956AF, not MI956F.**



Follow the steps below to install the Intel Management Engine.

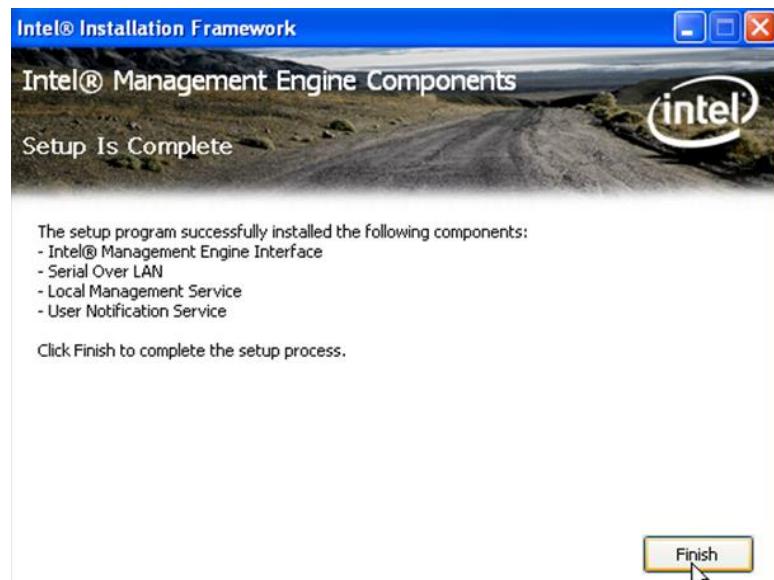
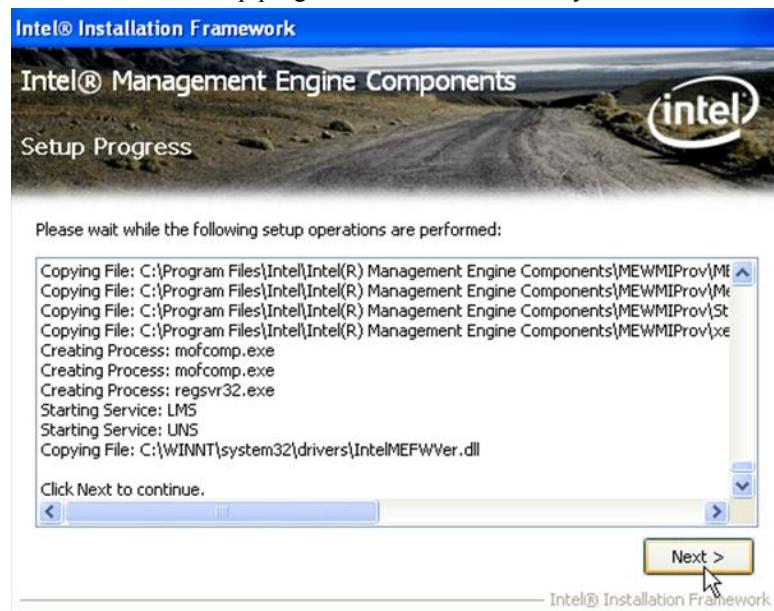
1. Insert the CD that comes with the board. Click **Intel** and then **Intel(R) AMT 7.0 Drivers**.



2. When the Welcome screen to the InstallShield Wizard for Intel® Management Engine Components, click **Next**. On the next screen, click **Yes** to to agree with the license agreement.



2. When the Setup Progress screen appears, click *Next*. Then, click *Finish* when the setup progress has been successfully installed.



## ASMedia USB 3.0 Drivers

1. Insert the CD that comes with the board. Click **Intel** and then **Intel(R) QM67/Q67 Chipset Drivers**.

2. Click **Intel(R) PRO LAN Network Driver**.



2. When the Welcome screen to the InstallShield Wizard for Intel® Management Engine Components, click **Next**.



3. When InstallShield Wizard is complete, click **Finish**.



## Appendix

### A. I/O Port Address Map

Each peripheral device in the system is assigned a set of I/O port addresses which also becomes the identity of the device. The following table lists the I/O port addresses used.

Address	Device Description
000h - 01Fh	DMA Controller #1
020h - 03Fh	Interrupt Controller #1
040h - 05Fh	Timer
060h - 06Fh	Keyboard Controller
070h - 07Fh	Real Time Clock, NMI
080h - 09Fh	DMA Page Register
0A0h - 0BFh	Interrupt Controller #2
0C0h - 0DFh	DMA Controller #2
0F0h	Clear Math Coprocessor Busy Signal
0F1h	Reset Math Coprocessor
1F0h - 1F7h	IDE Interface
278h - 27Fh	Parallel Port #2(LPT2)
2E8h - 2EFh	Serial Port #4(COM4)
2F8h - 2FFh	Serial Port #2(COM2)
2B0h - 2DFh	Graphics adapter Controller
360h - 36Fh	Network Ports
3B0h - 3BFh	Monochrome & Printer adapter
3C0h - 3CFh	EGA adapter
3D0h - 3DFh	CGA adapter
3E8h - 3EFh	Serial Port #3(COM3)
3F8h - 3FFh	Serial Port #1(COM1)

## B. Interrupt Request Lines (IRQ)

Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on board.

Level	Function
IRQ0	System Timer Output
IRQ1	Keyboard
IRQ2	Interrupt Cascade
IRQ3	Serial Port #2
IRQ4	Serial Port #1
IRQ5	Reserved
IRQ6	Reserved
IRQ7	Reserved
IRQ8	Real Time Clock
IRQ9	Reserved
IRQ10	Serial Port #3
IRQ11	Serial Port #4
IRQ12	PS/2 Mouse
IRQ13	80287
IRQ14	Primary IDE
IRQ15	Secondary IDE

## C. Watchdog Timer Configuration

The WDT is used to generate a variety of output signals after a user programmable count. The WDT is suitable for use in the prevention of system lock-up, such as when software becomes trapped in a deadlock. Under these sorts of circumstances, the timer will count to zero and the selected outputs will be driven. Under normal circumstance, the user will restart the WDT at regular intervals before the timer counts to zero.

### SAMPLE CODE:

```
//-----
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
// -----
#include <dos.h>
#include <conio.h>
#include <stdio.h>
#include <stdlib.h>
#include "F81865.H"
//-----
int main (int argc, char *argv[]);
void EnableWDT(int);
void DisableWDT(void);
//-----
int main (int argc, char *argv[])
{
    unsigned char bBuf;
    unsigned char bTime;
    char **endptr;
    char SIO;
    printf("Fintek 81865 watch dog program\n");
    SIO = Init_F81865();
    if (SIO == 0)
    {
        printf("Can not detect Fintek 81865, program abort.\n");
        ret = um(1);
    //if (SIO == 0)

        if (argc != 2)
        {
            pri = ntfl(" Parameter incorrect!\n");
            ret = um(1);
        }
        bTime = strtol (argv[1], endptr, 10);
        printf("System will reset after %d seconds\n", bTime);

        if (bTime)
        {
            EnableWDT(bTime);
        }
        else
        {
            DisableWDT();
        }
    }
    return 0;
}
```

```

//-----
void EnableWDT(int interval)
{
    unsigned char bBuf;

    bBuf = Get_F81865_Reg(0x2B);
    bBuf &= (~0x20);
    Set_F81865_Reg(0x2B, bBuf);           //Enable           WDTO
                                                //switch
    Set_F81865_LD(0x07);                 //switch           to logic device 7
    Set_F81865_Reg(0x30, 0x01);          //enable           timer

    bBuf = Get_F81865_Reg(0xF5);
    bBuf &= (~0x0F);
    bBuf |= 0x52;
    Set_F81865_Reg(0xF5, bBuf);          //count           mode is second
                                                //set             timer

    Set_F81865_Reg(0xF6, interval);      //set             timer

    bBuf = Get_F81865_Reg(0xFA);
    bBuf |= 0x01;
    Set_F81865_Reg(0xFA, bBuf);          //enable           WDTO output
                                                //start           counting
}
//-----
void DisableWDT(void)
{
    unsigned char bBuf;

    Set_F81865_LD(0x07);               //switch           to logic device 7
                                                //enable           WDTO output
    bBuf = Get_F81865_Reg(0xFA);
    bBuf &= ~0x01;
    Set_F81865_Reg(0xFA, bBuf);          //enable           WDT
                                                //disable
}
//-----

```

## APPENDIX

---

```
//-----
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//-----
#include "F81865.H"
#include <dos.h>
//-----
unsigned int F81865_BASE;
void Unlock_F81865 (void);
void Lock_F81865 (void);
//-----
unsigned int Init_F81865(void)
{
    unsigned int result;
    unsigned char ucDid;

    F81865_BASE = 0x4E;
    result = F81865_BASE;

    ucDid = Get_F81865_Reg(0x20);
    if (ucDid == 0x07)           //F
    {
        goto Init_Finish;      }

    F81865_BASE = 0x2E;
    result = F81865_BASE;

    ucDid = Get_F81865_Reg(0x20);
    if (ucDid == 0x07)           //F
    {
        goto Init_Finish;      }

    F81865_BASE = 0x00;
    result = F81865_BASE;

Init_Finish:
    return (result);
}
//-----
void Unlock_F81865 (void)
{
    outportb(F81865_INDEX_PORT, F81865_UNLOCK);
    outportb(F81865_INDEX_PORT, F81865_UNLOCK);
}
//-----
void Lock_F81865 (void)
{
    outportb(F81865_INDEX_PORT, F81865_LOCK);
}
//-----
void Set_F81865_LD(unsigned char LD)
{
    Unlock_F81865();
    outportb(F81865_INDEX_PORT, F81865_REG_LD);
    outportb(F81865_DATA_PORT, LD);
    Lock_F81865();
}
//-----
void Set_F81865_Reg(unsigned char REG, unsigned char DATA)
{
    Unlock_F81865();
    outportb(F81865_INDEX_PORT, REG);
    outportb(F81865_DATA_PORT, DATA);
    Lock_F81865();
}
//-----
unsigned char Get_F81865_Reg(unsigned char REG)
{
    unsigned char Result;
    Unlock_F81865();
```

---

```
-----  
outportb(F81865_INDEX_PORT, REG);  
Result = inportb(F81865_DATA_PORT);  
Lock_F81865();  
return Result;  
}  
-----  
  
-----  
//  
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY  
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE  
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR  
// PURPOSE.  
//  
-----  
#ifndef __F81865_H  
#define __F81865_H 1  
//  
#define F81865_INDEX_PORT (F81865_BASE)  
#define F81865_DATA_PORT (F81865_BASE+1)  
//  
#define F81865_REG_LD 0x 07  
//  
#define F81865_UNLOCK 0x 87  
#define F81865_LOCK 0x AA  
//  
unsigned int Init_F81865(void);  
void Set_F81865_LD(unsigned char);  
void Set_F81865_Reg(unsigned char, unsigned char);  
unsigned char Get_F81865_Reg(unsigned char);  
//  
#endif //__F81865_H
```